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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/595,415	06/16/2000	Hitoshi Seki	9651/4017	1580

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EXAMINER

AHMED, SHAMIM

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 12/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/595,415

Applicant(s)

SEKI ET AL.

Examiner

Shamim Ahmed

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 17-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 17-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1 and 17, as to the fact that Okinaka et al do not teach the composition comprises acetic acid, which have different chemical structure and different reactivity than the amino acetic acid (glycine) as discussed at page 7 of the response filed 9/17/04.

Accordingly, the rejection of claims 1 and 17 over Okinaka of the previous office action is withdrawn.

Applicants argue that Okinaka does not teach the claimed concentration range for maintaining uniform etching rate throughout the etching process.

In response, examiner states that Okinaka teaches a lower concentration range of the oxidizer is used to etch copper alloy, which requires frequent replenishing of the solution and possible increasing the etching time (col.2, lines 45-52).

Therefore, one of ordinary skill in the art would have been motivated to use a higher concentration of the oxidizing solution for the benefit of reduced process time.

In addition, examiner states that the claims are directed to a **composition** not an intended use of the composition and since the etching composition includes the same oxidizing agent, which is capable of etching the substrate uniformly as claimed.

As to claims 18-19, Applicants argue that Okinaka do not teach an etching agent for anisotropically etching a copper layer having an overlying mask pattern.

Art Unit: 1765

In response, examiner states that Okinaka teach the formation of pattern aluminum-copper alloy (15) layer, wherein the pattern is formed by using the etching composition having the claimed oxidizing agent (see col.3, lines 63-66, figure 2).

Furthermore, the claims are directed to a **composition** not an intended use of the composition.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1,17 and new claims 20-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Mueller et al (5,958,288).

Mueller et al disclose a composition for polishing or etching copper comprising an aqueous solution of an oxidizing agent, wherein the oxidizing agent is monopersulfate such as potassium hydrogen peroxomonosulfate (KHSO_5) (col.4, lines 26-31 and lines 66-col.5, lines 17).

Mueller et al also disclose that the concentration of the oxidizing agent is in the range of about 0.5 to about 50.0 weight percent, which reads on the claimed range of about 0.08 to about 2.0 mol/L (col.5, lines 18-20).

Mueller et al teaches the polishing rate of the metal layer is maintained at a substantially high rate by controlling decomposition of the oxidizing agent (col.7, lines 51-56).

Therefore, Mueller et al inherently teach that the copper layer is etched or removed at an approximately uniform rate.

Mueller et al teach that an additive such as acetic acid can be added to the aqueous solution to stabilize the oxidizer (col.7, lines 43-48).

As to claim 17, Mueller et al inherently teach that the slurry composition is capable of selectively etched/removed because Mueller et al's etching composition is exactly same as the invented composition.

As to the new claims 20-22, the etching solution is used **for** anisotropically etching a copper layer having a mask pattern, which limitation is **an intended use of the solution** and are given little weight when determining patentability. See Corning Glass works Vs. Sumitomo electronic USA, Inc., 868 Fd 1251, 1257,9 USPQ 2d 1962, 1966 (Fed. Cir. 1989).

Mueller teaches a composition having the exact same oxidizing agent and acetic acid (see above) as the invented ones and expected to have the same result such as the etch uniformity.

Similar analysis goes to the claims 23-26, as the future intended use of the composition for etching a copper layer with specific thickness or the copper layer comprises a gate electrode or a wiring layer are not given patentable weight because

Art Unit: 1765

the exact same composition is capable of doing the same and further more, a product or a composition is what it is, not what it does.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Condra et al (5,259,979) in view of Kubotera et al (4,297,436).

Condra et al disclose a process and a composition for micro etch cleaning of copper, wherein the composition comprises peroxygen compounds of preferred

Art Unit: 1765

oxidizing agent such as sodium or potassium monopersulfate (KHSO₅) or sodium or potassium peroxydisulfate (col.1, lines 6-9 and col.6, lines 54-64).

Condra et al fail to teach the exact range of oxidizing agent and also fail to teach the introduction of acetic acid and also fail to teach the concentration of the peroxycompound.

However, Kubotera et al disclose a composition of an etch-bleaching solution comprising oxidizing agent such as peroxy compounds and an organic acid such as acetic acid for promoting the etching action (col.13, lines 22-39).

Kubota et al also disclose the oxidizing agent is conventionally used in an amount of from about 0.01 to about 10% by weight of the etch-bleaching solution (col.13, lines 22-38).

So, Kubota et al teach that the concentration of the oxidizing agent of about 10% overlaps the claimed lower range of about 10.01% because it has been held that the claimed ranges overlap or lie inside ranges disclosed by the prior art is a prima facie case of obviousness. See *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Therefore, it would have been obvious to one skill in the art at the time of claimed invention to employ Kubotera et al's teaching into Condra et al's method for easily etching of copper by promoting the etching action as taught by Kubotera et al.

As to claim 17, modified Condra et al's composition is capable of selectively etching copper.

Art Unit: 1765

7. Claims 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okinaka (4,349,411).

As to claims 1 and 18, Okinaka disclose a composition for etching copper comprising an aqueous solution of an oxidizing agent, wherein the oxidizing agent is monopersulfate such as potassium hydrogen peroxomonosulfate (KHSO_5) and a complexing agent such as glycine (amino acetic acid), which is a derivative of acetic acid and broadly reads on the claimed generic form of acetic acid (col.1, lines 65-68 and col.2, lines 34-45 and lines 53-col.3, line 3).

Okinaka fails to disclose the exact concentration of the oxidizing agent such as the monopersulfate compound.

However, Okinaka discloses that the concentration of the oxidizing agent is in the range of 0.001 to 0.01 molar (equates up to 1.52%) and higher concentration may be used (col. 2, lines 45-49).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of claimed invention would have been motivated to optimize the concentration to an optimum value for increasing the etching rate at a desired value.

Okinaka teaches that complexing agent is used to prevent precipitation of copper ions in the solution in order to maintain the etching solution in active form during the etching process (col.2, lines 31-33).

Therefore, it would have been obvious that the etching solution will etch the copper at approximately uniform rate during the etching process because the etching

Art Unit: 1765

activity of the solution is maintained by introducing the complexing agent as taught by Okinaka.

As to claim 19, Okinawa's composition is capable of selectively etching copper.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (703) 305-2667. The fax phone

Art Unit: 1765

number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Shamim Ahmed
Examiner
Art Unit 1765

SA
December 4, 2004